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DEPARTMENT OF THE INTERIOR

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JOHN W. FINCH, DIRECTOR

INFORMATION CIRCULAR

REVIEW OF COAL-MINE FATALITIES IN INDIANA DURING THE LAST 3 MONTHS OF 1932 AND THE CALENDER YEAR 1933

BY

C. A. HERBERT

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REVIEW OF COAL-MINE FATALITIES IN INDIANA FOR THE LAST 3 MONTHS OF 1932 and THE CALENDAR YEAR 1933[1]

By C. A. Herbert[2]

Information Circular 6746 reviewed the fatalities in Indiana coal mines for the fiscal year October 1, 1931 to September 30, 1932. Since then Indiana has changed its fiscal year to the period July 1 to June 30, but as most statistical data on accidents are arranged according to calendar years, the data in this paper are for the last 3 months of 1932 and the calendar year 1933, rather than for the new Indiana fiscal year.

Tables 1 and 2 list the fatalities in Indiana coal mines[3] by cause and occupation for the last 3 months of 1932 and for the calendar year 1933. The fatalities for the small wagon mines employing fewer than 10 men are separated from those employing 10 or more men to call attention to the extremely high fatality rate in small mines, largely because the State mining law does not apply to them nor do they come under the jurisdiction of the Indiana mine inspectors; as a result health and safety conditions are extremely bad.

During the last 3 months of 1932, 5 (approximately 42 percent of the total) fatalities occurred in the small mines, while for the calendar year 1933, 12 (approximately 32 percent) of the fatalities occurred in them.

The Indiana Division of Mines and Mining estimates that these small mines have an annual production of approximately 325,000 tons, or about 4.5 percent of the total coal-mine production of the State. In other words, for these small mines the fatality rate per tons mined during 1933 was about 10 times as great as for the mines employing 10 or more men.

Another lamentable feature in connection with the fatalities in small mines is that very few carry any compensation insurance and the owners are not worth enough financially for dependents of victims to collect anything under the common law; as a result, the dependents of those killed usually are left penniless and subjects of public charity.

1/ The Bureau of Mines will welcome reprinting of this paper, provided the following footnote acknowledgment is used: "Reprinted from U. S. Bureau of Mines Information Circular 6828."

2/ Supervising engineer, U. S. Bureau of Mines, Vincennes, Ind.

3/ Strip mines are not included.

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TABLE 1. - Fatalities in Indiana coal mines for October, November, and December 1932 and the calendar year 1933, by causes

Causes	Fatalities for 1932[1] in mines employing		Total	Fatalities for 1933[2] in mines employing		Total
	10 or more men	Fewer than 10 men		10 or more men	Fewer than 10 men	
Underground						
Falls of roof	4	4	8	10	5	15
Falls of coal	-	-	-	1	-	1
Caught between car and rib	1	-	1	1	-	1
Run over by cars	-	-	-	3	-	3
Explosions (windy shots)	-	-	-	5	-	5
Ignition of gas	-	-	-	1	-	1
Caught between car and face	-	-	-	1	-	1
Electricity	-	-	-	1	-	1
Suffocation other than explosion	-	-	-	-	2	2
Falling persons	-	-	-	1	-	1
Explosives	-	-	-	-	3	3
Shaft	-	-	-	-	-	-
Cage	-	1	1	-	1	1
Falling down shaft	-	-	-	1	-	1
Material falling down	-	-	-	1	-	1
Surface						
Electricity	1	-	1	-	-	-
Lifting	1	-	1	-	-	-
Machinery	-	-	-	-	1	1
Total	7	5	12	26	12	38

1/ For October, November, and December 1932.
2/ For the calendar year 1933.

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TABLE 2. - Fatalities in Indiana coal mines for October, November, and December 1932 and the calendar year 1933, by occupation

Occupation	Fatalities for 1932[1] in mines employing		Total	Fatalities for 1933[2] in mines employing		Total
	10 or more men	Fewer than 10 men		10 or more men	Fewer than 10 men	
Miner	1	4	5	7	7	14
Loading-machine operator and helper	1	-	1	1	-	1
Mining-machine runner and helper	1	-	1	4	-	4
Trackleyer	1	-	1	1	-	1
Underground laborer	1	-	1	-	-	-
Trip rider	-	-	-	3	-	3
Driver	-	-	-	3	-	3
Shot firer	-	-	-	3	-	3
Motorman	-	-	-	1	-	1
Night boss	-	-	-	2	-	2
Face boss	-	-	-	1	-	1
Owner of small mine	-	1	1	-	5	5
Top labor	2	-	2	-	-	-
Total	7	5	12	26	12	38

1/ For October, November, and December 1932.
2/ For the calendar year 1933.

Through the courtesy of A. G. Wilson, Chief Mine Inspector, the fatal accident reports of the deputy mine inspectors were reviewed, as well as the evidence at the coroners' inquests for the period covered by this circular, and the information is summarized for each fatality.

FATALITY 1

A worker at a clay-products plant was killed by a fall of rock while attempting to mine some coal for his own use along the edge of an abandoned strip pit; evidently he was not an experienced miner, as he had made essentially no attempt to protect himself with timber while gouging out the coal under the side of the pit.

FATALITY 2

A loading-machine operator was hit by a fall of rock and died 3 days later. He and his helper had tested the roof shortly before the accident and found the roof slightly drummy. They tried to pull down the loose rock

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with a pick but were unable to do so and thought it would be safe to work under until the place was loaded out. The roof was "sweating" and contained some slips, which probably precipitated the fall.

This is another of many cases where men believed they could judge how long it would be safe to work under loose rock, and their judgment proved to be faulty, with disastrous results.

Whenever roof is found to be loose, it either should be taken down or timbered securely before any persons are allowed to work under it.

FATALITY 3

A miner was killed by a fall of rock at the face. Five men were working on a cooperative basis to obtain their winter supply of coal from a small opening in the outcrop of a coal seam. The report does not state whether they were experienced miners, but probably they were not. A fall of slate occurred at the face, striking one of the men and killing him, and while his partners were attempting to remove the piece of rock a second and larger fall injured one of the other men.

Doubtless the danger could have been detected and the fatality avoided if the men had taken time to test the roof properly.

FATALITY 4

A miner employed at a wagon mine was killed by a fall of rock; he was working alone at the time of the accident when a large piece of rock weighing 1 to 2 tons, fell and crushed him.

The report does not state when the roof was tested last or whether the place was well-timbered. Doubtless this fatality could have been averted if the deceased had tested the roof carefully at frequent intervals by the vibration and sounding methods and had taken prompt precautionary action upon finding loose material overhead.

FATALITY 5

A tracklayer was killed by a fall of rock at a room neck; he started to extend track into a room neck when a pit boss, examining the roof, found it to be dangerous, and ordered the tracklayer to stop working until the place was made safe. The tracklayer went up the entry for his truck and with the assistance of the motor boss pushed it to the point where he had been working and where a laborer was getting ready to make the place safe. Upon reaching this point they stopped the truck, and the tracklayer stepped under the loose rock just as it fell.

This accident apparently was due to the carelessness of the tracklayer, as he was fully informed of the dangerous condition of the roof; accidents of this type are by no means uncommon, though they certainly are inexcusable.

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FATALITY 6

A laborer on the night shift was killed by being crushed between a car and the rib; he was riding on top of a haulage locomotive and either fell or jumped and was caught between the first car of the trip and the rib. The empty trip was just leaving the shaft bottom and was moving slowly; the motorman did not see the accident but hearing the deceased cry out he immediately stopped the trip and found the deceased standing between the first car and the rib.

The point where the laborer was killed was on a curve where for approximately 6 feet the clearance between the top edge of the car and the rib was only about 6 inches.

This fatality was caused by a combination of two hazardous practices--permitting employees to ride on top of haulage locomotives and failure to provide clearance between cars and rib--which have been responsible for many fatalities.

FATALITY 7

A tipple worker died as a result of rupture caused by lifting a heavy piece of rock; he was working alone after hoisting had stopped removing large pieces of "sulphur" and rock that had been taken from the picking tables during the shift. Lifting one large piece caused a rupture from which he died 2 hours later; this is a type of accident difficult to avoid, yet it would be avoided if employees were instructed as to the maximum weight they should try to lift.

FATALITY 8

A miner in a small wagon mine was killed by a fall of rock; he was working alone turning a room, and had been dead some time when found. The rock that killed him was roughly 4 feet in diameter and 1 foot thick in the thickest place. The report does not state whether the working place had been examined by anyone before the accident, but it probably had not as supervision is usually lacking in these small mines. No doubt the dangerous condition of the roof could have been detected and the accident prevented had proper precautions been taken.

FATALITY 9

A mining-machine helper was killed by a fall of slate. The roof at the face of the entry where the fatality occurred was known to be dangerous because of slips. The face boss stated that he had tested the roof in this place about an hour before the accident occurred and found it to be safe. The report does not indicate whether the machinemen had also tested the roof, but it is presumed they had not, as they had set the machine jack against the loose rock and had just finished "sumping in" when the rock fell. The piece of rock was about 8 feet long, 7 feet wide, and 1 foot thick in the thickest place.

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Merely sounding a piece of rock of this size might not give a true indication of its dangerous condition. Roof should be tested by the vibration method—holding the fingers of one hand against the roof and tapping it with a pick or preferably a bar held in the other hand and observing whether the overhead material vibrates or moves slightly when struck, at the same time noting the sound.

FATALITY 10

One of the owners of a small wagon mine was killed by a falling cage. Just as he stepped on the cage to be lowered into the mine, the ring on top of the cage to which the hoisting rope was attached broke and the cage fell to the bottom of the shaft, a distance of 40 feet.

The partner who acted as hoisting engineer stated that he had just turned the steam into the engines and lowered the cage to the ground landing when the accident occurred. The hoisting apparatus had not been examined before the accident, and the hoisting engine had not been operated to make sure the equipment was in good condition. This again is typical of the lack of safety precautionary procedure in the operation of very small mines.

FATALITY 11

A miner was killed by a fall of rock at the face of an entry.

The roof in this mine was generally known to be dangerous and was particularly so at the point where the accident occurred, as a "roll" crossed the entry at this place. The entry face had been shot the night before, and only 1 car of coal had been loaded out at the time of the accident.

Although the timber supply was ample at the crosscut 60 feet back from the face, none had been set within 25 feet of the face.

The deceased's partner claimed that they tested the roof about 20 minutes before the accident and thought it was safe. This is probably another case of knowing that the roof was loose but believing it was possible to judge how long it would be safe to work under it without making it secure; or it is another case of trying to determine the condition of roof by "sounding" rather than by testing by the vibration method. The rock that fell was about 6 feet long, 5 feet wide, and 1 foot thick.

FATALITY 12

A topman was electrocuted by an electric current from a high-tension line.

During construction work a ginpole had been erected under a 3,300-volt high-tension line, the top of the pole being approximately 3 feet beneath the wires. The deceased, who was operating a hand hoist at the bottom of the pole, was electrocuted when the electric current arced from the wires to the steel hoisting rope which ran through a metal pulley near the top of the pole.

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FATALITY 13

A trip rider was run over by a moving trip. He was riding on the front end of a locomotive and jumped off and ran ahead of the oncoming loaded trip to open a trapdoor. When he reached the door he stumbled and fell; as he was only about 20 feet from the oncoming trip, the motorman was unable to stop the trip in time to avoid running over him.

A trip consisted of the locomotive, 16 loaded cars, and 1 empty car. The track was downgrade toward the door, which added to the difficulty of stopping the trip.

This is one of many fatalities due to trip riders stumbling and falling in front of moving trips while running ahead to open trapdoors or to throw switches; this is a dangerous practice and one that should not be permitted.

FATALITY 14

A shot firer was killed by an explosion from a blown-out shot caused by overcharged and poorly placed shots of black blasting powder in a mine where the coal is shot from the solid. This fatality and many similar ones that have occurred in Indiana and other coal-mining States as a result of "solid shooting" could have been prevented if the coal had been undercut and shot with permissible explosives. Hundreds, possibly thousands, of lives have been uselessly sacrificed in United States coal mines through the use of black blasting powder.

FATALITY 15

A miner in a small wagon mine was suffocated by explosives fumes. The miner and his son were working at the face of a room 100 feet past the last crosscut. The mine had no fan and had to depend on natural ventilation, which had been insufficient to carry away the fumes from black blasting powder shots fired the previous evening. The father, feeling the effects of the explosives fumes, called for help; by the time help arrived both men were unconscious. The son revived in fresh air, but the father failed to respond to artificial respiration.

Mines employing fewer than 10 men do not come under the State mining law, and the State Inspection Department has no jurisdiction over them; as a result they are usually operated with little regard for the safety of the men employed, and generally the owner or owners are those adversely affected.

FATALITY 16

A miner was killed while retimbering a shaft.

The shaft timbering decayed, and the shaft had caved tight at a certain place. The deceased and another man were standing on the caved material in the shaft while retimbering when the debris suddenly gave way, carrying the two men with it. One escaped injury, but the other was buried and killed.

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This fatality could have been prevented by the use of safety belts or a floating scaffold.

FATALITY 17

A miner was killed by a fall of roof near the face of a room in a small, cooperative mine; he had been warned of the dangerous condition of the roof soon after he started to work in the morning and promised either to take down the loose rock or to timber it before loading out the coal. He continued to work under the loose roof, however, doubtless depending upon his judgment as to how long he could work with safety; about 3 hours later the rock fell and killed him. There was plenty of timber in the working place to make it safe.

Often it is not sufficient to tell a workman to make himself safe when he is found working under dangerous conditions; those in charge should practically always stay with him until the place is made safe, or at least until the work of making it safe has been started, and should return at intervals to make sure the work is being done according to instructions.

FATALITIES 18 AND 19

Two shot firers were suffocated by afterdamp from an explosion caused by blown-out shots of black blasting powder.

The coal in this mine is shot from the solid with black blasting powder, and the report indicates that nearly all the shots in this instance were dangerously overcharged. After lighting the shots in the section where the explosion originated the two shot firers retired to a refuge hole, fitted with a strong door, to wait for the shots to explode. The men were found in the refuge hole, suffocated by the afterdamp.

The mine was dry and dusty, yet no protection had been afforded against the propagation of a coal-dust explosion either by rock-dusting or by the application of water.

Undercutting the coal, the use of permissible explosives, rock-dusting at and near the face, and wetting the coal face would have prevented this explosion.

FATALITY 20

A miner was electrocuted by a trolley-wire circuit; he was loading steel rails onto a mine car on the entry. He had lifted one end of the rail onto the car and was lifting the other end from the ground to slide the rail up onto the car when the upper end of the rail came in contact with the trolley wire, electrocuting him. An unsuccessful attempt was made to revive him by administering artificial respiration.

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This accident, as well as many others due to loading and unloading supplies underground, could have been prevented if trucks rather than mine cars had been used for transporting material. It is much easier and safer to load and unload a supply truck than a mine car.

FATALITY 21

A miner died 4 days after receiving injuries from falling slate, while riding on a man trip at quitting time.

The deceased and six other men were riding to the shaft bottom at quitting time in a mule-drawn car. A large quantity of slate fell on them from the rib at a high place on the entry. Because of an adverse grade the track had been elevated at the point where the injury occurred, necessitating a considerable amount of roof brushing. No timbering had been done at this point as the roof had arched over and was thought to be safe.

This fatality is chargeable to lack of supervision.

FATALITY 22

A motorman received severe injuries when he either fell or was knocked from his motor. Pneumonia developed, and he died 2 weeks later.

No one witnessed this accident, and the injured man was unable to talk because of his injuries; hence the cause of his fall from the motor and what might have prevented it are unknown.

FATALITIES 23 AND 24

Two night bosses were killed in an explosion caused by blown-out shots of black blasting powder.

Three poorly placed black-blasting-powder shots blew out the stemming on the night before the explosion. At the end of the shift on the night of the explosion the two night bosses reloaded these holes and fired them again; again they blew out, this time causing a violent explosion in which the two bosses were killed.

This explosion was due to recklessness on the part of the victims, who without question knew the danger of firing shots a second time. Better supervision on the part of the company, particularly over the placement of shots, is indicated as being necessary, and again black blasting powder is seen needlessly taking the lives of underground employees.

FATALITY 25

A miner was killed by a fall of slate while running a locomotive; he and another miner were "syndicating" a pair of entries; that is, they were undercutting, shooting, loading, and switching the cars and performing all

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the main underground operations of mining necessary to drive the entries. At the time of the injury they were switching a car; the deceased was running the locomotive, and his partner was "lining up" the switches. A large piece of roof fell on the deceased, causing injuries from which he dies about 5 months later.

It appears from the report that the roof at the switch where the injury occurred had not been properly timbered, although the roof was known to contain many slips. This accident is certainly chargeable to poor supervision.

FATALITY 26

A miner was killed by falling face coal.

A miner in a hand-loading mine was undermining standing loosened coal to get a good fall of coal. The face coal gave way suddenly, covering him and inflicting injuries from which he dies 3 weeks later.

This is one of many fatal injuries due to this cause. The practice of first loading the loose coal in front of a shot and then undermining the standing loosened coal to get an easy fall is very dangerous. The face coal should be pulled from the top as the loose coal at the front is loaded.

Lack of supervision and of rules for safe operation are indicated.

FATALITY 27

One of the owners of a small wagon mine was killed by a cage at the bottom of a shaft. There were no witnesses. A few moments before the accident the deceased had pushed a timber truck to within 15 feet of the shaft, the track at this point being downgrade toward the shaft. It is supposed that the deceased failed to block the car, which ran forward toward the cage and struck him just as the cage on which he was standing was hoisted from the bottom; the car which had run onto the cage was caught on the brow of the shaft opening, and the deceased fell into the sump and was killed.

The accident apparently was due to failure of the deceased to block the timber truck properly.

FATALITY 28

A loading-machine operator was killed by a fall of rock; he ordered his helper to knock out some posts that were in the way of the loading machine. About 20 minutes after the posts had been knocked out a large piece of slate which they had been supporting fell and killed the loading-machine operator, seriously injuring a trip rider who was standing near the loading machine at the time of the accident.

Knocking out posts set to support the roof because they are in the way of the loading machine is an extremely dangerous practice, which is followed more or less frequently and as a matter of habit and should be prohibited.

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If it is necessary to remove posts, crossbars should be set to replace them, the loose roof should be taken down, or possibly other posts should be set to replace temporarily those which have been removed. This type of accident is far too prevalent where cutting or loading machines are being used in coal mines and is wholly unnecessary if a reasonable amount of time and effort is exerted toward making conditions safe.

FATALITY 29

A driver was run over by his car. No one witnessed this accident, but it is supposed that the deceased was riding on the front end of the loaded car, as is the practice. The track at the point of the accident is down grade; doubtless the driver lost his balance and fell in front of the car while standing on the bumper and leaning forward with one hand on the mule to keep the car from running up on it.

Riding on the front end of cars, although almost universally practiced in Indiana coal mines, is extremely dangerous and has resulted in many fatal and nonfatal injuries.

FATALITY 30

A mining-machine operator was killed by a fall of roof.

The roof in the room where the accident occurred had numerous water slips, and a timberman had been sent into this place to make it secure; he had pulled down a quantity of loose slate and pronounced the room safe about 2 hours before the accident. The drilling crew had left the place only about an hour ahead of the cutting-machine crew and pronounced the roof safe at the time they left.

The helper on the mining machine stated that the roof did not look good and spoke to the runner about it, but the runner said it was all right. The rules at this mine require the mining-machine crews to test the roof before beginning to cut the face, but in this instance they had been delayed because of cable trouble and did not take the time to test the roof properly. While they were oiling the machine after finishing the cut the roof fell and killed the machine runner.

This accident indicates clearly that roof pronounced safe once cannot be expected to remain so indefinitely; if accidents from falls of roof are to be prevented, the roof must be tested at frequent intervals during every working shift.

FATALITY 31

One of the owners of a small wagon mine employing fewer than 10 men received injuries from the sweep of a "gin" hoist, from which he died 10 days later. The deceased was operating the "gin" hoist used for hoisting the cage in the shaft. The counterbalance for the cage broke, causing the sweep to whirl around and strike him, inflicting injuries from which he died.

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From the report it appears that the accident was due to lack of proper inspection of the hoisting equipment.

FATALITY 32

A tracklayer was killed by a fall of rock while riding on a haulage locomotive.

The wooden leg supporting one end of a steel crossbar gave way as the locomotive was passing. Two men riding on the front end of the locomotive were uninjured, but the motorman and the tracklayer, who were riding in the cab at the back, were knocked from the locomotive and covered with rock. The motorman escaped serious injury, but the tracklayer was killed instantly.

The failure of the leg was due to decay, and doubtless its condition could have been detected by inspection; the use of treated timber would prevent many accidents of this kind.

FATALITY 33

A trip rider was killed by a fall of rock while standing in the center of a roadway.

The roof in this mine loosens and falls in warm weather and needs close attention. The room boss claimed he had examined the roof about 2 hours before the accident and found it safe.

Doubtless this accident could have been prevented had the entry been supported with crossbars.

FATALITY 34

One of the owners of a small mine was overcome by explosives fumes.

This fatality occurred in a small wagon mine employing fewer than 10 men and hence not under the mining law or the jurisdiction of the State Inspection Department. The mine depended entirely on natural ventilation and had only one shaft.

About 3 hours after quitting time the deceased climbed down buntons to the bottom of the shaft (a distance of 120 feet) to repair a pump; about half an hour later he called for help. As the steam pressure was insufficient to operate the hoisting engine and as it was necessary to send for the hoisting engineer before the cage could be operated, considerable delay ensued in getting the man out of the mine. Fourteen black blasting powder shots had been fired at quitting time, and the deceased was asphyxiated by the fumes from these shots.

This fatality points to the necessity of making all State mining laws applicable to all mines, irrespective of the number of men employed. If this mine had been equipped with a ventilating fan and the mine had been properly ventilated this fatality would not have occurred; and it is entirely probable

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that if permissible explosives had been used poisonous gases would not have been present. Moreover, if safety is to be considered no underground coal mine should be operated unless it has more than one opening to the surface.

FATALITY 35

A miner in a small mine employing three men was killed by a fall of rock on the entry while pushing a loaded car.

The roof in this mine is poor, as it has numerous water slips which require careful and close timbering. The timbering, however, had been neglected, as is usual in these small mines, and this neglect is responsible for this fatality.

FATALITY 36

A machine runner was killed by a fall of slate.

The room in which this accident occurred had just passed through a "horseback"; a crack extending from rib to rib had appeared in the roof between thie "horseback" and the face. The loader had just finished loading the coal at the face of the room when the machine crew came in to undercut the place. The loader called the crew's attention to the crack and cautioned them to be careful, whereupon the deceased sounded the top with a pick and declared it safe. Forty minutes later, just as they were finishing the undercut, a large piece of rock fell, killing the machine runner. The rock extended the full width of the room and was about 3 feet thick in the center and 6 feet across.

The roof had not looked safe to the loader, although due to the size of the piece of loose rock it had apparently sounded solid when hit with a pick. Possibly if the machineman had used the vibration method of testing instead of depending upon sound alone he could have detected the dangerous condition of the roof. There was ample timber in the room to make the place safe, and this should have been the first consideration, but frequently machine operators and crews do not care to consume time and effort to set timbers even though their own lives are at stake.

FATALITY 37

A miner in a small mine employing fewer than 10 men was killed by a roof fall. The accident occurred just after work had started in the morning. The miner had pushed an empty car into his room and was digging a ditch to allow the water to drain away from the face. Hearing the roof begin to "work" he started to run back from the face but was caught under the edge of the fall. The piece of slate that fell was about 18 feet long, 16 feet wide, and 1 to 5 feet thick.

The place had not been properly timbered, and as the coal was shot from the solid it is probable that any timber that may have been set was shot out the previous night; shooting off the solid carries with it numerous hazards, among them a considerable difficulty in keeping timbers in place in the face region where the greatest hazards exist.

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If the miner had examined the roof carefully when he entered the place, doubtless he would have discovered its dangerous condition and could have taken the necessary procautions to make the place safe.

FATALITY 38

A miner was killed by a fall of top coal while he was helping a tracklayer place a switch at a room neck near the face of the entry. Before starting to work the tracklayer noticed that the overhanging top coal was loose and asked one of the loaders working at the face of the entry to put a prop under it, which he did. Shortly afterward, while a hole was being dug for a tie, the top coal fell, striking one of the miners and inflicting injuries from which he died. The piece of top coal measured about 8 by 4½ feet and was 14 inches thick. Setting the prop under the top coal very probably caused it to break off at the rib; in this case, instead of setting a prop under it the loose top coal should have been taken down, even though it would have delayed the tracklayer in his work. Far too frequently underground workmen neglect their own safety to "save time".

FATALITY 39

A miner fell down the shaft at 6:45 a.m. as the men were being lowered into the mine. The south cage was at the ground landing; the south gate was opened, and the deceased with others walked towards the cage. However, instead of walking onto the cage with the other men he crossed over to the north or empty compartment of the shaft and either stumbled and fell into the open shaft or walked into it with suicidal intent.

The surface landing at this mine is fenced, and the gates are about 10 feet back from the shaft. There are no gates at the top of the shaft to keep persons within the enclosure from falling into the shaft. There should have been gates at the shaft as well as in the enlosure fence.

FATALITY 40

A mining machineman was killed by being crushed between a car and the face. He and his helper were preparing to undercut the face when two cars were accidentally switched into the place. Because of the noise made by a loading machine in a connecting place the deceased did not hear the cars until it was too late to get out of the way, and he was crushed between one of the cars and the face. The switch at the entry had not been lined up with the straight track.

It should be the duty not only of the haulage crews but also of those working at the face to make sure that switches when not in use are "lined up" with the straight track, particularly when the working place is going to the dip. Here is another of numerous fatalities caused indirectly through noise made by machinery of various kinds in use at or near working faces in mines.

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FATALITY 41

A miner was killed by a fall of slate; he and his partner were loading a car of coal when a piece of rock, approximately 9 feet long, 7 feet wide, and 5 inches thick, fell and struck him on the head, fracturing his skull.

The timbering in the room was too far back from the face for safety, although the ample supply of posts close at hand could have been used to make the place safe.

The deceased's partner claims they tested the roof a short time before the accident occurred and that the roof sounded solid. This fatality again exemplifies the danger of depending solely on sound when testing roof; unquestionably the vibration method should be used.

FATALITY 42

A farmer was killed by a fall of rock in a small mine, while he and another farmer were getting out their winter supply of coal from a small slope mine or farm. The two men had timbered the place well and had sounded the sandstone top and thought from the sound that it was safe.

While the deceased was mining some coal along the rib, a piece of sand rock about 6 feet long, 3 feet wide, and 18 inches thick fell out between the ribs and the posts, crushing him.

This is another instance in which testing roof by sound alone did not give a true indication of its dangerous character. The vibration method should always be used as it not only gives the sound but also indicates whether the material under test vibrates or moves when struck by the bar in testing.

FATALITY 43

A driver was killed by a fall of rock on the shaft bottom 20 feet from the shaft. He had stopped to fill his carbide lamp when a piece of rock about 5 feet long, 4 feet wide, and 12 inches thick fell on him, inflicting injuries from which he died about 12 hours later.

The deceased had called the mine bosses' attention to the dangerous condition of the roof 2 days before the accident, but nothing had been done to make it secure. This fatality is chargeable to carelessness of the mine management.

FATALITY 44

A face boss was burned so severely by the ignition of a pocket of gas by an open light that he died a month later.

On the night before the accident the fire boss had noticed "drippers" in the roof of the room where the accident occurred but found no gas. He

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reported the drippers to the superintendent and suggested that the place be kept under close supervision. The next day (Sunday) the room boss was looking after some emergency timbering nearby and went in to examine the place in which the drippers had been observed. Apparently a fall liberating methane had occurred in the room between the time of the fire boss's visit and that of the room boss. The room boss walked into the room wearing a carbide lamp which ignited the gas, and he received burns from which he died a month later.

At many mines in Indiana the bosses are required to wear electric cap lamps and carry lighted flame safety lamps with them at all times. If such a rule had been in force at this mine, doubtless this fatality would not have occurred. Regardless of this fact the room boss, knowing that roof drippers are often followed by falls and gas, of his own accord should have made an examination for gas in this room before entering with his open light. This is a type of accident which is going to occur with more or less monotonous regularity just as long as open lights are used in coal mines.

FATALITIES 45, 46, AND 47

Three miners working in a small mine died as a result of burns caused by accidental ignition of black blasting powder while charging shot holes; the employees at the mine had attended a union meeting, following which the owner of the mine intended to go below and blast, but knowing his father was not feeling well the 16-year old son of the owner and 5 other men volunteered to do the blasting for him.

While one of the men was making a cartridge of black blasting powder his cap and carbide lamp fell from his head into the explosive, igniting both the cartridge and the explosive in the keg. The 6 men in the room were severely burned, 3 of them so severely that they died.

It is dangerous to use black blasting powder, even when it is handled carefully. The practice of making cartridges of black blasting powder while wearing an open light or in proximity to an open light is extremely hazardous and has resulted in scores of fatalities in coal mines of the United States.

The mine owner either should have done the blasting himself, as was his custom or should have designated a competent man to do it for him instead of allowing 6 inexperienced men to attempt to do the shooting.

FATALITY 48

A trip rider was crushed between a car and the rib.

An empty trip was being pushed around a turn into a pair of side entries to couple to two empty cars that had been left there on a previous trip. The trip rider was riding on the bumper on the outby end of the last car; this car, while being pushed around the turn, jumped the track, catching the trip rider between the corner of the car and the rib.

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Riding the front bumper of a pushed trip is a dangerous practice. The trip rider should have ridden inside the car.

FATALITY 49

A mining-machine runner was injured by a fall of rock from which he died about 2 months later.

The coal at this mine is loaded mechanically, and the regular cycle of operation is for the timberman to follow the loading machine and to make the place safe ahead of the undercutting or drilling crews. On this particular day a change in timberman had been made, and the new timberman had failed to make the working place safe ahead of the undercutting crew. The latter was in a hurry and failed to examine the place, evidently depending on the timberman to make the place safe. The instructions to machine crews at this mine are to examine the roof before beginning to undercut, but in this instance the crew failed to do so.

Inasmuch as a new timberman was working on the day of the accident, the boss in charge should have made sure to visit the working places to determine their safety ahead of the machine crew. The machine crew was also remiss in not carrying out instructions to examine the roof before beginning to work. This accident was due to carelessness of both workers and management.

FATALITY 50

A loaded car ran over a driver, who received injuries from which he died the same day.

The deceased was riding on the front end of a two-car trip. As the track was downgrade and no sprags were used, he was doubtless standing with one hand on the mule to keep the cars from hitting it, and the mule stumbled, causing the driver to fall in front of the car.

Riding on the rear end of trips is the practice in many mines; if it had been the practice at this mine this accident would not have occurred.

SUMMARY

Fatalities for the entire 15-month period have been tabulated in table 3 to show occupation, cause of fatality, cause of accident, and how accident could have been prevented. Under the caption "Responsibility for accidents," an attempt has been made to fix the responsibility for each fatality; a summary of the assigned responsibility is included at the bottom of the table.

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TABLE 3. - Occupation, cause of fatality, cause of accident, means of prevention, and responsibility for accident
October to December 1932

Case	Occupation	Cause of fatality	Cause of accident	Means of preventing accident	Responsibility for accident
1 1/	Miner (getting out his winter coal)	Fall of rock.	Lack of experience; lack of timbering.	Timbering.	Miner.
2	Loading-machine operator	Do.	Carelessness; faulty judgment of injured; lack of timbering; lack of supervision.	Pulling down loose rock; better supervision.	Miner and company.
3	Miner	Do.	Failure to test roof.	Testing roof; pulling down loose rock or timbering.	Miner.
4 1/	Do.	Do.	Do.	Testing roof; pulling down loose rock or timbering; better supervision.	Miner and company.
5	Tracklayer	Do.	Carelessness.	Education of workman in safety.	Workman.
6	Laborer	Crushed between car and rib.	Lack of clearance; riding on top of locomotive.	Proper clearance; prohibit riding on locomotives.	Company.
7	Top laborer	Lifting heavy rock.	Faulty arrangement in tipple, making it necessary to lift rock.	Lowering rock chute.	Do.
8	Miner	Fall of rock.	Failure to test roof; lack of proper supervision.	Proper testing of roof; proper supervision.	Miner and company
9	Mining machine helper	Do.	Failure to test roof properly.	Greater care on part of workman.	Workman.
10 1/	Owner	Falling cage.	Breaking rope connection to cage.	Daily testing of hoisting apparatus.	Company.
11	Miner	Fall of rock.	Failure to test roof properly and to make place safe.	Either taking down or timbering loose roof; better supervision.	Miner and company.
12	Topman (not company employee)	Electricity.	Setting gin pole too close to high tension wires.	Setting gin pole farther away from wire	Contractor doing construction work.

1/ Mine employing fewer than 10 men.

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and responsibility for accident--Continued
Calendar year 1933

Case	Occupation	Cause of fatality	Cause of accident	Means of preventing accident	Responsibility for accident
13	Trip rider	Run over by cars.	Jumping off and running ahead of moving trip.	Stopping trip and not permitting trip riders to jump off or on moving trips.	Company.
14	Shot firer	Suffocation.	Blown-out shot of black blasting powder.	Undercutting coal; permissible explosives.	Do.
15 1/	Miner.	Do.	Black blasting powder fumes; lack of ventilation.	Better ventilation.	Do.
16	Do.	Material falling in shaft.	Failure of company to provide proper safeguards.	Providing men with safety belts or floating platform.	Do.
17 1/	Do.	Fall of roof.	Failure to follow instructions of company either to timber or take down loose rock.	Timbering and better supervision.	Employee and company.
18	Shot firer	Suffocation.	Blown-out shot of black blasting powder; dust explosion.	Undercutting coal; permissible explosives.	Company.
19	Do.	Do.	Do.	Do.	Do.
20	Miner	Electric shock.	Lifting steel rail on top of car in proximity to trolley wire.	Using low truck for hauling material; cut off power.	Do.
21	Do.	Fall of slate from rib.	Lack of examination of roof and ribs on roadway.	Better supervision.	Do.
22	Motorman	Falling off moving locomotive.	Unknown.	Unknown.	Unknown.
23	Night boss	Violence from explosion.	Dust explosion due to firing dangerous black blasting powder shots.	Using permissible explosives.	Man and company.
24	Do.	Do.	Do.	Do.	Do.
25	Miner	Fall of rock.	Failure of company to keep roof on entry safe.	Better supervision.	Company.
26	Do.	Fall of face coal.	Undermining standing coal.	Pulling down loose coal on face as coal is loaded out; better supervision.	Miner and company.

1/ Mine employing fewer than 10 men.

(2500)

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TABLE 3. - Occupation, cause of fatality, cause of accident, means of prevention, and responsibility for accident--Continued
Calendar year 1933--Continued

Case	Occupation	Cause of fatality	Cause of accident	Means of preventing accident	Responsibility for accident
27 1/	Owner	Cage.	Improper blocking of car.	Blocking cars at shaft bottom.	Owner.
28	Loading-machine operator.	Fall of rock.	Knocking out props under loose rock.	Making place safe before removing props in the way of loader.	Man and company.
29	Driver	Run over by car.	Riding on front end of car.	Better supervision; riding on back end of car.	Company.
30	Mining-machine runner.	Fall of rock.	Failure to test roof.	Testing roof and setting timber or pulling down loose rock.	Employee.
31 1/	Owner	Hit by gin sweep	Failure to inspect hoisting equipment.	Better supervision; inspection of hoisting equipment.	Owner.
32	Tracklayer	Fall of rock.	Failure by decay of wooden leg supporting crossbar; lack of inspection.	Closer inspection of timbering on roadways; use of treated timber.	Company.
33	Trip rider	Do.	Failure to timber entry properly.	Proper timbering of entry under poor roof.	Do.
34 1/	Owner	Suffocation.	Black blasting powder fumes; lack of ventilation.	Proper ventilation.	Owner.
35 1/	Do.	Fall of rock.	Lack of timbering.	Making entry secure by proper timbering.	Do.
36	Mining-machine runner.	Do.	Failure to test roof properly; faulty judgment.	Proper timbering of room or pulling down loose rock.	Employee.
37 1/	Miner.	Do.	Failure to test roof; lack of timbering; lack of supervision.	Proper timbering; better supervision.	Company
38	Do.	Do.	Failure to pull down loose top coal; faulty judgment.	Pulling down loose top coal.	Miner and tracklayer.
39	Do.	Fell down shaft.	Lack of gates at top of shaft.	Gates at top of shaft.	Company.
40	Machineman	Caught between car and face.	Failure to line switch with straight track.	Rules covering haulage and proper enforcement of them.	Other employee and company.

1/ Mine employing fewer than 10 men.

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TABLE 7. - Occupation, cause of fatality, cause of accident, means of prevention, and responsibility for accident--Concluded
Calendar year 1933--Concluded

Case	Occupation	Cause of fatality	Cause of accident	Means of preventing accident	Responsibility for accident
41	Miner	Fall of rock.	Failure to timber place properly; improper testing.	Keeping place properly timbered; frequent testing of roof.	Man and company.
42[1]	Owner.	Do.	Failure to test roof properly.	Using vibration and sounding methods of testing.	Owner.
43	Driver	Do.	Failure by company to make entry safe; dangerous condition was known.	Placing necessary timber.	Company.
44	Face boss	Ignition of gas.	Failure of boss to examine for gas; failure of company to require bosses to carry electric cap lamps and flame safety lamps.	Testing for gas; company requiring bosses to use electric cap lamps and carry flame safety lamps.	Employee and company.
45[1]	Miner	Ignition of black blasting powder.	Wearing open light while handling black blasting powder.	Taking lamp off head and placing at safe distance.	Men and company.
46[1]	Do.	Do.	Do.	Do.	Do.
47[1]	Do.	Do.	Do.	Do.	Do.
48	Trip rider	Crushed between car and rib.	Riding on bumper permitted by company.	Riding inside car.	Company.
49	Machineman	Fall of rock.	Failure of machineman to test roof, depending on others for his own safety; lack of supervision.	Testing roof; better supervision.	Man and company.
50	Driver	Run over by car.	Riding on front end of car; mule stumbled.	Riding on rear bumper, using sprags going downhill	Company.

1/ Mine employing fewer than 10 men.

Responsibility:

Employee or individual killed	8
Employee or individual killed, and company or owner	19
Company or owner	20
Fellow employee and company or owner	1
Unknown	1
Employee killed and fellow employee	1
	50

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CONCLUSIONS

With the exception of the one fatality of unknown cause, the evidence indicates that all fatalities might have been prevented if the men, the company, or both had taken the available precautions.

Unquestionably mine accidents, both fatal and nonfatal, can be greatly reduced; there are now too many outstanding examples of what has been accomplished along this line for any other conclusion. Companies have succeeded in reducing accident rates largely by learning from past accidents to eliminate as far as possible the dangerous conditions and practices that have caused these accidents and thus have prevented their recurrence.

This review of fatal accidents in Indiana has been made with the hope that lessons may be drawn from them that will tend to prevent similar accidents in the future.

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